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DAM-RAISED FAWNS, AN ALTERNATIVE TO BOTTLE FEEDING

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ABSTRACT.—Rearing young ungulates for ecological studies is costly and time consuming. Doe-rearing mule deer (*Odocoileus hemionus*) fawns is a viable alternative to the common method of bottle-feeding. Fawns tamed while nurtured by their tractable dams showed no marked difference in tractability over bottle-reared orphans. The advantages of doe-rearing are better health for the young and convenience for the handler.

The use of tame animals to obtain information on the foraging behavior and habitat selection of wild ungulates is increasing. This technique has been used with many native North American species (Reichert 1972) as well as several from Africa (Hutchison 1970). Close observation of foraging animals offers more precise dietary assessment than fecal/urine sample analyses or distant observation, yet time and monetary investments required to rear and train experimental animals are high. Several methods for successfully rearing tractable animals have been reported. The most common is bottle-raising captured neonates (Schwartz et al. 1976, Hobbs and Baker 1979, Addison et al. 1983) or the young born to either penned wild or tame dams (Reichert 1972, Knorre 1974). Another option is aming wild-caught yearlings, as discussed by Creulen (1977).

The Utah Division of Wildlife Resources has maintained a tame mule deer (*Odocoileus hemionus*) herd for more than 30 years by bottle-feeding fawns. In the last three years 14 fawns have been tamed while nurtured by their dams. We report this as a viable alternative to bottle-rearing of young, with advantages in better health and convenience.

REARING

The herd was maintained in a 1-ha compound on the foothills of the Bear River Range at Logan, Utah. Beginning in early June the does were carefully observed for signs of impending parturition. They were then put into separate 5 x 25 m outdoor runs each with an

open-air shed and hay bedding. The fencing must be stout to withstand aggressive behaviors between does and of a fine mesh wire on the bottom meter to prevent fawns from escaping. The sheds were cleaned of soiled bedding daily to reduce development and spread of disease. Green alfalfa hay, barley, balanced-ration pellets, and clean water were available ad libitum. To supplement the sparse forage growing in the runs, the animals were given freshly clipped mixed forbs (mostly alfalfa) morning and evening for a month postpartum and whenever a source was available thereafter. As noted by Schwartz et al. (1976) for pronghorn (*Antilocapra americana*) fawns, the deer fawns also consumed small quantities of soil beginning at about one week of age.

When possible, births were attended to assure the health of both fawn(s) and doe and to ensure that the fawn(s) obtained colostrum. If the doe did not attend the young, they were removed and subsequently bottle-raised. However, the inability to provide milk alone did not dictate bottle-rearing. The doe's licking of the perianal region stimulated the fawn to seek out a teat (or nipple) and nurse. This response could be used to advantage when supplemental bottle-feeding was required. One doe, with mastitis, cleaned her fawn while it nursed from a bottle. This doe-handler cooperation carried through until weaning.

During the first week does were kept with their fawns 24 hours a day. The young were exposed to a minimum of 3 hours human contact and gentle handling per day. By the sec-

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ond week does were turned out in the morning, returned at noon to clean and nurse their young, turned out again in the afternoon, and put in for the night in the evening. Generally, from the third week until fawns were weaned at three months, the dams were eager to get out in the mornings and were left out until evening. Any fawn handling or training could proceed as described by others (Reichert 1972, Parker et al. 1984).

HEALTH

The most common diseases encountered were of intestinal microbes causing diarrhea leading to rapid dehydration, emaciation, and death. Although Kramer et al. (1971) discussed the occurrence of *Escherichia coli* in mule deer, and Schwartz et al. (1976) found *Clostridium perfringens* to be a problem in pronghorn, our major concern was with *Coccidia* spp. Upon detection of this protozoan, 12.5% sodium sulfamethazine was used to prevent and treat the *Coccidia* infections. The drinking water was treated for two days with 8ml/l water (1 oz/gal) at time of birth, at one week postpartum (when the fawns begin drinking water), at two weeks, and anytime thereafter when loose or watery feces were noticed. A change in the character of the feces is the cue to an intestinal infection. For a more detailed discussion of the normal changes that the feces of young growing fawns undergo see Schwartz et al. (1976).

Although sulfamethazine is commonly used on livestock, Schwartz et al. (1976) noted that the drug may crystalize in the urine and kidneys of young animals. As an alternative they recommended the use of Sulfaquinoxaline. Sulfamethazine was effective in controlling diarrhea in all the nine fawns treated and we have, as yet, experienced no adverse effects. We do, however, recommend caution in the use of this drug.

In their evaluation of fawn-rearing procedures, Halford and Alldredge (1978) concluded that doe-reared fawns had no health advantage over those bottle-raised. They experienced 67% (6 of 9 total) mortality of dam-raised fawns to necrobacillosis (*Fusibacterium necrophorum*), whereas the mortality of hand-raised fawns was only 33% (3 of 9 total), entirely due to *E. coli* and *Streptococcus* spp.

umbilical infections. Unlike the hand-raised fawns, however, 6 of the 9 dam-raised fawns (67%) were: (1) kept in pens with no forbs or grasses available, (2) at higher animal densities, and (3) nursing does that had been on deficient diets. As reviewed by Hibler (1981), necrobacillosis is often associated with poor range and crowded conditions. Therefore, the losses due to this disease, as well as many others, may well be averted under better conditions.

DISCUSSION

Over three years 14 fawns have been raised by does, and we bottle-reared 7 orphans. There was no notable difference in the tractability of the animals reared by these two methods, but there was a marked difference in favor of dam-reared fawns in their stature as yearlings and two-year-olds. This was particularly noticeable in those raised as singles rather than twins by their dam. If given a choice, raising singles is preferable. They exhibited a faster growth rate and were generally more robust than twins. In addition, the lactation drain on the doe was greatly reduced.

Our visual assessment agreed with Halford and Alldredge (1978), who reported significantly higher ($P < .001$) mean body weight and growth rates of fawns raised by their dam as compared to those bottle-reared. Our yearling bucks were equal to or larger in stature than the bottle-raised two-year-olds and were of substantially heavier build than their bottle-raised cohorts. A more quantitative indication of physical condition is the minimum breeding age of females (Mackie et al. 1982). Of two doe fawns sired by the same buck and raised concurrently, the dam-raised one gave birth to a fawn at one year of age. This is a rare occurrence and was not matched by her bottle-fed half sister.

There are two major advantages of doe rearing fawns: (1) health—there is no substitute for the dam's nurturing, species specific colostrum, and doe's milk, which has twice the nutritional value of cow's milk (Short 1981), and (2) time—time and inconvenience spent in cleaning and preparing bottles three to five times daily is eliminated, thus allowing more time for direct contact with the young.

It is unknown whether a key period for imprinting on a handler exists. Our fawns were first exposed to humans between 0 and 24 hours after birth. The animals were predominately handled by two people, yet were in frequent contact with others. Several authors stress the bond formation between handlers and bottle-raised young (Schwartz et al. 1976, Addison et al. 1983). Without the dependence on a handler for feed, the development of confidence between handlers and lam-reared fawns is very important. Initially, preferential behavior was exhibited toward the handlers; yet, amity or distrust did develop toward anyone with whom the animals had contact. The fawns' response to individuals gradually moderated through their first year.

The work reported herein was done with fawns born to tractable does. The presence of same conspecifics eases the handling of new animals (Kreulen 1977). Some species, though, may not be suited for this method of rearing. As part of a project involving white-tailed (*Odocoileus virginianus*), mule, and black-tailed (*O. h. columbianus*) deer in New Hampshire, an effort was made to raise two sets of twin white-tailed deer fawns on their dams. The does were the most tame of the herd; however, their fawns were never approachable despite constant human contact. One set eventually brought about their own deaths in panicked flight (P. Pekins, personal communication). In time the adaptable species will be known. Until then dam-raising young should be considered as an option when rearing animals for ecological studies.

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